

WHAT IS CLAIMED IS:

1. A surgical apparatus for driving surgical fasteners comprising:

- a) a frame portion;
- b) an elongated body portion extending distally from the frame portion and defining a longitudinal axis;
- c) a staple applying assembly pivotal about a pivot point adjacent a distal end of the elongated body portion, the staple applying assembly including:
 - i) a cartridge housing;
 - ii) a staple cartridge mounted to the cartridge housing, and having a plurality of surgical staples disposed therein; and
 - iii) an anvil member having a staple forming surface thereon, the anvil member being movable between an open position wherein at least a portion of the staple forming surface is spaced from the staple cartridge and a closed position wherein the staple forming surface is in close cooperative alignment with the staple cartridge; and
- d) an articulation mechanism operatively connected to the staple applying assembly, which includes:
 - a rotatable member; and
 - first and second coupling members operatively associated with the rotatable member and the staple applying assembly, wherein rotation of the rotatable member causes the staple applying assembly to pivot from a first position having a longitudinal axis substantially aligned with the longitudinal axis of the elongated body portion to a second articulated position wherein the longitudinal axis of

the staple applying assembly is positioned at an angle to the longitudinal axis of the elongated body portion.

2. A surgical apparatus according to claim 1, further comprising:
at least one flexible cam bar movable within the staple cartridge while
5 the staple applying assembly is in an articulated orientation, to effect ejection of the plurality of surgical staples from the staple cartridge.

3. A surgical apparatus according to claim 2, wherein the at least one flexible cam bar includes two flexible cam bars.

4. A surgical apparatus according to claim 1, wherein the rotatable
10 member is rotatable about an axis perpendicular to the longitudinal axis.

5. A surgical apparatus according to claim 1, wherein rotation of the rotatable member in a clockwise direction causes the first coupling member to move in a proximal direction and a second coupling member to move in a distal direction.

6. A surgical apparatus according to claim 1, further comprising a first
15 control knob, the first control knob being rotatable to rotate the elongated body portion about the longitudinal axis.

7. Surgical apparatus according to claim 6, further comprising a second control knob operably associated with the staple applying assembly, the second control

knob being rotatable to rotate the staple applying assembly in relation to the elongated body portion.

5 8. A surgical apparatus according to claim 3, wherein the cartridge housing includes at least one bearing positioned to guide the cam bars as the cam bars move within the staple cartridge.

9. A surgical apparatus according to claim 1, wherein the first and second coupling members include first and second portions of a cable loop.

10. An apparatus for driving surgical fasteners comprising:

- 10 a) a frame portion;
- b) an elongated body having a proximal portion extending from said frame portion and an articulating distal portion;
- c) a cartridge assembly mounted in said articulating distal portion and having a tissue engaging surface thereon;
- 15 d) an anvil member having a fastener forming surface thereon, said anvil member and said cartridge assembly configured for relative movement between an open portion wherein said fastener forming surface is spaced from said tissue engaging surface and a closed position wherein said fastener forming surface is in close cooperative alignment with said tissue engaging surface;
- 20 e) an articulation member mounted for longitudinal movement within said proximal portion of said elongated body and a linkage assembly mounted in said proximal portion of said elongated body and cooperating with said

articulating distal portion, said linkage assembly including at least one reciprocally translatable coupler link;

5 f) an actuation assembly which includes a movable handle actuatable from said frame portion for moving at least one of said anvil member and said cartridge assembly between said open position and said closed position,

wherein longitudinal movement of said articulation member causes axial translation of said coupler link, thereby effecting articulation of said articulating distal portion relative to said proximal portion.

10 11. The apparatus of claim 10, wherein said articulation member cooperates with a manipulator sleeve movably mounted with respect to said proximal portion of said elongated body adjacent said frame portion.

12. The apparatus of claim 11, further comprising a barrel cam positioned within said proximal portion of said elongated body, said barrel cam cooperating with said manipulator sleeve such that movement of said manipulator sleeve is translated into movement of said articulation member by said barrel cam.

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13. The apparatus of claim 10, wherein said linkage assembly includes first and second coupler links.

14. The apparatus of claim 13, wherein said first coupler link is a drive link and said second coupler link is a follower link.

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15. The apparatus of claim 10, wherein said articulation member is a transmission rod positioned within and axially movable with respect to said proximal portion of said elongated body and an articulating member, said transmission rod extending between said actuating member and said linkage assembly.

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16. The apparatus of claim 15, further comprising a barrel cam associated with said actuating member, and wherein said transmission rod is mounted to said barrel cam.

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17. In an apparatus for applying surgical fasteners which includes a frame, an elongated portion mounted to said frame, an anvil mounted with respect to said elongated portion, a cartridge assembly containing a plurality of surgical fasteners movably mounted with respect to said elongated portion and juxtaposed with respect to

said anvil, and an actuating member movably mounted with respect to the frame for effecting longitudinal movement of a member for causing movement of the anvil and cartridge with respect to each other, the improvement comprising:

a linkage assembly positioned in said elongated portion
5 which includes at least one reciprocally translatable coupler link;

an actuation member positioned adjacent said frame and
movable with respect thereto; and

a transmission rod extending from said actuation member
to said linkage assembly,

10 wherein movement of said actuation member with respect
to said frame effects movement of said transmission rod and said at least one coupler
link, thereby causing said anvil and said cartridge assembly to pivot with respect to said
elongated portion.

15 18. The apparatus of claim 17, wherein said actuation member is
movably mounted with respect to said elongated portion.

19. The apparatus of claim 17, wherein said linkage assembly
includes a driver link and a follower link.

20 20. The apparatus of claim 10, further including a pneumatic system
located on a proximal end of the apparatus, the pneumatic system including a piston
with a piston head portion disposed in a drive cylinder and adapted for application of
pneumatic force thereto, said piston head portion having an elliptical configuration and
being positioned within said drive cylinder which has opposed proximal and distal end

portions and a complementary operative elliptical transverse cross-sectional configuration, the drive cylinder having a longitudinal axis substantially parallel to the longitudinal axis of the tool assembly wherein the pistol head portion is pneumatically actuated to translate from the distal end portion of the drive cylinder away from the tool assembly and towards the proximal end portion of the drive cylinder and is spring
5 biased towards the distal end portion of the drive cylinder.

21. The apparatus of claim 17, further including a pneumatic system located on a proximal end of the apparatus, the pneumatic system including a piston with a piston head portion disposed in a drive cylinder and adapted for application of
10 pneumatic force thereto, said piston head portion having an elliptical configuration and being positioned within said drive cylinder which has opposed proximal and distal end portions and a complementary operative elliptical transverse cross-sectional configuration, the drive cylinder having a longitudinal axis substantially parallel to the longitudinal axis of the tool assembly wherein the pistol head portion is pneumatically
15 actuated to translate from the distal end portion of the drive cylinder away from the tool assembly and towards the proximal end portion of the drive cylinder and is spring biased towards the distal end portion of the drive cylinder.

22. A surgical apparatus for driving surgical fasteners comprising:
a) a frame portion;
20 b) an elongated body portion extending distally from the frame portion and defining a longitudinal axis;

c) a staple applying assembly pivotal about a pivot point adjacent a distal end of the elongated body portion, the staple applying assembly including:

i) a cartridge housing;

5 ii) a staple cartridge mounted to the cartridge housing, and having a plurality of surgical staples disposed therein; and

10 iii) an anvil member having a staple forming surface thereon, the anvil member being movable between an open position wherein at least a portion of the staple forming surface is spaced from the staple cartridge and a closed position wherein the staple forming surface is in close cooperative alignment with the staple cartridge; and

d) an articulation mechanism operatively connected to the staple applying assembly, which includes:

15 a linkage at least partially disposed within the elongated body portion and being longitudinally movable parallel to the longitudinal axis of the elongated body portion, the linkage having a distal end portion operably connected to the staple applying assembly, wherein the connection of the linkage and staple applying assembly is offset from the pivot point between the staple applying assembly and the elongated body portion,

20 wherein longitudinal motion of the linkage causes the staple applying assembly to articulate about the pivot point between the staple applying assembly and the elongated body portion with respect to the longitudinal axis of the elongated body portion.

23. A surgical apparatus according to claim 22, wherein the linkage includes a rod having proximal and distal end portions and a link having proximal and distal end portions, wherein the distal end portion of the rod is operably connected to the link and the distal end portion of the link is operably connected to the staple applying assembly such that longitudinal motion of the rod causes longitudinal motion of the link to cause the staple applying assembly to articulate.

24. A surgical apparatus according to claim 22, further comprising: at least one flexible member movable within the staple cartridge while the staple applying assembly is in an articulated orientation, to effect ejection of the plurality of surgical staples from the staple cartridge.

25. A surgical apparatus according to claim 22, further comprising a first control knob operably connected to the elongated body portion, the first control knob being rotatable to rotate the elongated body portion about the longitudinal axis.

26. A surgical apparatus according to claim 25, further comprising a second control knob operably associated with the staple applying assembly and operably connected to the linkage, the second control knob being movable to articulate the staple applying assembly in relation to the elongated body portion.

27. A surgical apparatus according to claim 26, wherein the second control knob is rotatable.

28. A surgical apparatus according to claim 24, wherein the cartridge housing includes at least one bearing positioned to guide the flexible member as it moves within the staple cartridge.

5 29. A surgical apparatus according to claim 23, further comprising a coupling member for operatively coupling the distal end of the rod to the link.